CLAIMS

1. An α-sialon-based oxynitride phosphor characterized in that the content of α-sialon represented by the general formula:

$$M_xSi_{12-(m+n)}Al_{(m+n)}O_nN_{16-n}:Ln_y$$

(wherein

M is at least one metal selected from among Li, Ca, Mg, Y or lanthanide metals excluding La and Ce,

Ln is at least one lanthanide metal selected from among Ce, Pr and La or at least one lanthanide metal selected from among Eu, Dy, Er, Tb and Yb,

$0.3 \leq x+y < 1.5$,

$0 < y < 0.7$,

$0.3 \leq m < 4.5$,

$0 < n < 2.25$, and

$m = ax + by$, where a is the valence of the metal M and b is the valence of the lanthanide metal Ln),

wherein all or a portion of the metal M dissolved in the α-sialon is replaced with the lanthanide metal Ln as the luminescence center,

is 75 wt% or greater when the lanthanide metal Ln is at least one lanthanide metal selected from among Ce, Pr and La and 90 wt% or greater when the lanthanide metal Ln is at least one lanthanide metal selected from among Eu, Dy, Er, Tb and Yb,

and in that the content of metal impurities other than the metal M, lanthanide metal Ln, silicon, IIIA elements (aluminum, gallium), oxygen and nitrogen, is no greater than 0.01 wt%.

2. An α-sialon-based oxynitride phosphor according to claim 1, wherein Ln is at least one lanthanide metal selected from among Ce, Pr and La, and the α-sialon content is 90 wt% or greater as measured by powder X-ray diffraction, with the remainder consisting of β-sialon and oxynitride glass.

3. An α-sialon-based oxynitride phosphor according to claim 1, wherein Ln is at least one lanthanide metal selected from among Eu, Dy, Er, Tb and Yb, and the α-sialon content is 95 wt% or greater as measured by powder X-ray diffraction, with the remainder consisting of β-sialon and oxynitride glass.

4. An α-sialon-based oxynitride phosphor according to claim 1, wherein the content of metal impurities other than the metal M, lanthanide metal Ln, silicon, IIIA elements (aluminum, gallium), oxygen and nitrogen, is no greater than 0.001 wt%.

5. An α-sialon-based oxynitride phosphor according to claim 1, wherein the median size in the particle size distribution curve is no greater than 8 μm.

6. An α-sialon-based oxynitride phosphor according to claim 1, wherein the 90% size in the particle size distribution curve is no greater than 25 μm.

7. A process for producing an α-sialon-based oxynitride phosphor, wherein a mixed powder comprising a nitrogen-containing silane compound and/or amorphous silicon nitride powder having the oxygen content adjusted to 1-5 wt%, AlN and/or Al powder, an oxide of a metal M or a precursor substance which is converted to an oxide of a metal M upon thermal decomposition, and an oxide of a lanthanide metal Ln or a precursor substance which is converted to an oxide of a lanthanide metal Ln upon thermal decomposition, in a combination such that the metal impurity content is no greater than 0.01 wt% as calculated on the basis of the product being represented by the general formula:

$$M_xSi_{12-(m+n)}Al_{(m+n)}O_nN_{16-n}:Ln_y$$

(wherein M is at least one metal selected from among Li, Ca, Mg, Y or lanthanide metals excluding La and Ce, and

Ln is at least one lanthanide metal selected from among Ce, Pr and La or at least one lanthanide metal selected from among Eu, Dy, Er, Tb and Yb,

$0.3 \le x+y < 1.5$,

$0 < y < 0.7$,

$0.3 \le m < 4.5$,

$0 < n < 2.25$, and

$m = ax + by$, where a is the valence of the metal M and b is the valence of the lanthanide metal Ln), is fired at 1400-2000°C in a nitrogen-containing inert gas atmosphere.

8. A process for producing an α-sialon-based oxynitride phosphor, wherein a mixture obtained by adding a pre-synthesized α-sialon powder represented by the general formula: $M_xSi_{12-(m+n)}Al_{(m+n)}O_nN_{16-n}$ (wherein the definitions in the formula are the same as below) or the general formula: $M_xSi_{12-(m+n)}Al_{(m+n)}O_nN_{16-n}:Ln_y$ (wherein the definitions of M, Ln, x, y, m and n are the same as below) to a mixed powder comprising a nitrogen-containing silane compound and/or amorphous silicon nitride powder having the oxygen content adjusted to 1-5 wt%, AlN and/or Al powder, an oxide of a metal M or a precursor substance which is converted to an oxide of a metal M upon thermal decomposition, and an oxide of a lanthanide metal Ln or a precursor substance which is converted to an oxide of a lanthanide metal Ln upon thermal decomposition, in a combination such that the metal impurity content is no greater than 0.01 wt% as calculated on the basis of the product being represented by the general formula:

$M_xSi_{12-(m+n)}Al_{(m+n)}O_nN_{16-n}:Ln_y$

(wherein M is at least one metal selected from among Li, Ca, Mg, Y or lanthanide metals excluding La and Ce, and

Ln is at least one lanthanide metal selected from among Ce, Pr and La or at least one lanthanide metal selected from among Eu, Dy, Er, Tb and Yb,

$0.3 \le x+y < 1.5$,

$0 < y < 0.7$,

$0.3 \le m < 4.5$,

$0 < n < 2.25$, and

$m = ax + by$, where a is the valence of the metal M and b is the valence of the lanthanide metal Ln), is fired at 1400-2000°C in a nitrogen-containing inert gas atmosphere.

9. A process for producing an α-sialon-based oxynitride phosphor according to claim 7 or 8, wherein the specific surface area of the nitrogen-containing silane compound and/or amorphous silicon nitride powder is 80-600 m^2/g.

10. A process for producing an α-sialon-based oxynitride phosphor according to claim 7 or 8, characterized in that the content of metal impurities other than Li, Ca, Mg, Al, Si, Ga, Y and lanthanide metals in the nitrogen-containing silane compound and/or amorphous silicon nitride powder and the AlN and/or Al powder is no greater than 0.01 wt%, and the content of carbon is no greater than 0.3 wt%.

11. A process for producing an oxynitride phosphor composed mainly of α-sialon according to claim 10, characterized in that the content of metal impurities other than Li, Ca, Mg, Al, Si, Ga, Y and lanthanide metals in the nitrogen-containing silane compound and/or amorphous silicon nitride powder and the AlN and/or Al powder is no greater than 0.001 wt%, and the content of carbon is no greater than 0.15 wt%.

12. A process for producing an oxynitride phosphor composed mainly of α-sialon according to claim 7 or 8, characterized in that the firing is carried out at 1400-1800°C in a nitrogen-containing inert gas atmosphere at a pressure of 1 atmosphere.

13. A process for producing an oxynitride phosphor

composed mainly of α-sialon according to claim 7 or 8, characterized in that the firing is carried out in a temperature range of 1600-2000°C in a pressurized nitrogen gas atmosphere.

14. A process for producing an oxynitride phosphor composed mainly of α-sialon according to claim 13, characterized in that the firing is carried out in a temperature range of 1600-1900°C in a pressurized nitrogen gas atmosphere.

15. A light emitting device comprising

a light emitting diode, and

a transparent medium comprising an oxynitride phosphor according to any one of claims 1 to 6 dispersed therein, and covering the surface of said light emitting diode.

16. A light emitting device according to claim 15, wherein said light emitting diode is a blue light emitting diode, and said luminescent device is a white light emitting device.